I claim:

1. An optical dispersion compensator, comprising:

an optical input receiving an incoming signal having an input spectrum;

a frequency demultiplexer connected to said input and configured to split the incoming signal into two frequency bands;

two transmission links connected to said frequency demultiplexer and each receiving a respective one of the two frequency bands, said transmission links including an optically shorter transmission link and an optically longer transmission link acting as a delay line;

a polarization converter connected in at least one of said transmission links; and

at least one frequency recombination unit connected to said transmission links for recombining the signals received from said transmission links, and having an optical output.

2. The dispersion compensator according to claim 1, wherein said first and second transmission links are Mach-Zehnder arms.

3. The dispersion compensator according to claim 1, wherein said input is connected to receive the incoming signal from an optical transmission link.

4. The dispersion compensator according to claim 1, wherein said optical output is connected to output an optical signal recombined from the spectrally divided signals to an optical transmission link.

5. The dispersion compensator according to claim 1, wherein said frequency recombination unit is a TE/TM polarization combiner.

6. The dispersion compensator according to claim 1, wherein said frequency recombination unit is a 3-dB coupler.

7. The dispersion compensator according to claim 1, wherein at least one of said transmission links is split into at least two partial links, and wherein a drivable 1xN switch, a drivable Nx1 switch, and N partial links are connected between said switches, wherein N is an integer.

8. The dispersion compensator according to claim 7, wherein said 1xN switch and said Nx1 switch are thermo-optically driven.

9. The dispersion compensator according to claim 7, wherein said 1xN switch and said Nx1 switch are electro-optically driven.

10. The dispersion compensator according to claim 1, which comprises a TE/TM phase shifter connected in at least one of said transmission links.

11. The dispersion compensator according to claim 10, wherein said TE/TM phase shifter is connected behind said polarization converter in an optical signal flow direction.

12. An optical signal link, comprising a dispersion compensator according to claim 1 and a polarization controller connected upstream of said optical input of said dispersion compensator.

13. The optical signal link according to claim 12, wherein said polarization controller is formed with two Mach-Zehnder arms and a phase shifter in at least one of said Mach-Zehnder arms.

14. The optical signal link according to claim 13, wherein said polarization controller further comprises a TE/TM divider at an input and a frequency recombination unit at an output thereof, and said two Mach-Zehnder arms of said polarization

controller are connected between said TE/TM divider and said frequency recombination unit.

15. The optical signal link according to claim 14, which comprises a polarization converter connected in at least one of said Mach-Zehnder arms of said polarization controller.

16. The optical signal link according to claim 13, wherein said polarization controller further comprises a bipolar polarization converter and mode sorter at an input thereof and a frequency recombination unit at an output thereof, and wherein said at least two Mach-Zehnder arms of the polarization controller are connected between said bipolar polarization converter and mode sorter and said frequency recombination unit.

17. An optical signal link, comprising a dispersion compensator according to claim 1, and a polarization scrambler and a polarizer connected to said optical input of said dispersion compensator.

18. The optical signal link according to claim 17, wherein said polarizer is one of a TE mode and a TM mode polarizer.

19. A method of compensating for a dispersion of an optical signal, which comprises:

transmitting an optical signal via an optical fiber, the optical signal having a frequency spectrum composed of two frequency bands f_H and f_L, splitting the frequency bands into one Mach-Zehnder arm each, and subjecting the frequency bands to different propagation delays; and

recombining the two frequency bands transmitted in the two Mach-Zehnder arms and polarized orthogonally with respect to one another during the combining.